Digital Transformation: A Pathway to Connect Higher Education Institutions to the Requirements of Increasingly Digitalised, Interrelated and Globalised Societies

Adrian Estrela Pereira[1]

Over the past two decades, the use of digital technologies in higher education has reshaped traditional teaching and learning paradigms. COVID-19 has highlighted the importance of digitalisation mechanisms and emphasised the need for higher education institutions (HEIs) to engage in strategic digital transformation (DT) projects. Despite the investments, challenges such as insufficient internet access and limited digital competence prevent students from benefiting from the new technologies. In this context, the following research primarily aims to reflect on the importance of DT strategies to ensure the relevance of HEIs in an increasingly digitalised world. To support the main purpose, this article presents three specific objectives:

(1) to review the current state of digital transformation in public and private HEIs;
(2) to identify the main barriers that prevent digital transformation processes; and
(3) to discuss possible institutional and governmental policy-oriented initiatives to encourage digital transformation in HEIs.

The methodology used is based on the application of Qualitative Document Analysis (QDA), a rigorous approach that aims to systematically identify, examine and select relevant academic sources. The study argues that in order to maintain their relevance, higher education institutions need to develop strategic plans for digital transformation that include short, mid and long-term goals.

Keywords: digital transformation; higher education; COVID-19; digitalisation, information and communication technologies

DOI: https://doi.org/10.71134/YGS.2025.1.3

Introduction

In recent decades, higher education institutions have undergone digital transformation processes. As pioneers in the e-learning domain, they are now evolving into institutions offering blended services and focussing on the co-creation of knowledge. The aim of this paper is to present the following:

(1) an overview of the dynamic aspects of digitalisation and the concept of a cluster organisation as an academic agile business case;

(2) additional arguments for the internal stakeholders of universities to develop an understanding

1 Adrian Estrela Pereira | Institution: Eötvös Loránd University | E-mail: adrian.estrela@gmail.com

of and better meet the demands of the digital society, in particular the competences and processes required in the digital transformation process to capture the quality of a university's response;

(3) examples of how selected universities have managed their digital offerings within their strategic management framework, planned tools and platforms within academic agile business models; and

(4) a selection of supports for a management team leading the digitalisation of the university. The study is based on a literature review using meta-analysis as research method.

The challenge for higher education lies not only in the fact that VUCA concepts, which stand for volatility, uncertainty, complexity and ambiguity, entail considerable risks but also offer numerous benefits if implemented responsibly (Panthalookaran, 2022). The future students who are entering university have been born and raised in an environment where the internet has become as commonplace and ubiquitous as a television set or a light bulb (Abad-Segura et al., 2020). This digital generation uses computers and smart devices consistently to an extent that is unprecedented when compared to the user behavior of all other generations. Consequently, our students are often better educated in the IT skills that form the core of most imported DT competencies.

The recent digital transformation is not only impacting the economy, institutions and businesses, but is fundamentally changing lives and lifestyles, especially the way our societies are organised (Argüelles-Cruz et al., 2021; Benavides et al., 2020; UNESCO IESALC et al., 2024) – think, for example, of energy or health systems at country level, smart catalytic city activities in growing urban areas, or future markets with a global dimension such as autonomous cars or smart manufacturing. In this context, society's greatest desire is that our existing and future university graduates and labour force have the necessary skills. Therefore, teaching/learning processes need to meet the new challenges.

Digital Transformation Conceptual Framework

Higher education institutions are facing major challenges in order to meet the requirements of a digitalised, networked and globalised society (Haque et al., 2023; Kannadhasan et al., 2020; Molenda, 2022). As information and communication tools and connectivity have created a multitude of changes and opportunities in society, businesses and government systems, higher education institutions are confronted with stakeholders who place new demands on higher education (Cheng et al., 2022; Giesenbauer & Müller-Christ, 2020; Langrafe et al., 2020). As a starting point, digital transformation can be understood as a concept that indicates that the institutions need to focus on long-term strategic approaches in which the integration of digital technology leads to changes in both organisational activities and business models (Bygstad et al., 2022; Mohamed Hashim, Tlemsani, & Duncan Matthews, 2022; Mohamed Hashim, Tlemsani, & Matthews, 2022; Sá & Serpa, 2020).

One of the most important questions that arises is whether the teaching, research and transfer projects designed and implemented by universities for the community and society meet the needs of digitised, interconnected and globalised societiesby taking full advantage of the many benefits associated with obtaining, processing and using large amounts of diverse data, without overlooking the risks associated with rapid processing and biassed and non-transparent data extraction, with

insufficient control over the use of data for unethical purposes. This issue deserves to be examined in the context of the 21st-century framework, in which there are more and more globalised societies, living increasingly intertwined lives, both on a digital and analogue level. It is important to emphasise that even in this complex, dynamic and multi-layered context, the structures and processes of higher education institutions continue to value collaboration, cooperation and inclusivity (Castells, 2014; Phelps, 2007; Ramose, 2009).

Digital transformation is now considered one of the main drivers of public ICT policy and is at the centre of numerous reports defining the main strategic areas and priorities for its implementation, compared to other similar and related concepts such as digital government, e-government, e-governance, e-gov, information society, knowledge society, virtual society, and network society (Brunetti et al., 2020; Kraus et al., 2021; Peng & Tao, 2022; Tangi et al., 2021). In contrast, the digital transformation has not yet reachedthis level of maturity in other research areas that are either less technology-oriented or not yet aware of the impact and characteristics of information and communication technologies in our society (Benavides et al., 2020; Brunetti et al., 2020; García-Morales et al., 2021). This is the case of higher education institutions, whose mission can be summarised as organisations that aim to produce, organise, disseminate and maintain specialised knowledge and provide specialised training at the highest level for undergraduate, postgraduate and doctoral students through teaching and learning activities or extracurricular technical, scientific, and cultural activities (Abad-Segura et al., 2020; García-Peñalvo, 2021; Phelps, 2007).

Hei Functions In Globalised Societies

The flexibility that enables users to adapt to different learning speeds and learning methods should be provided. It is a fundamental requirement of the digital society that the educational system should be inclusive and provide education to everyone who wants and needs it (Rapp & Corral-Granados, 2024; UNESCO IESALC, 2022). The lack of access to technology is a major obstacle to people's development. This is perhaps one of the deadliest catches for the world in the digital age. In a world where technology companies can impact the daily lives of a significant number of people, the consequences are even more compelling.

The new requirement is to be agile, because nothing is more constant than change (Miceli et al., 2021). In order to see change as an opportunity, the pain of transitions should be smoothed through planning. This means that stakeholders in the education system should continuously come together to promote collective change. To enable individuals to work on a level playing field and remain competitive, lifelong learning systems must be feasible and available. These systems must collaborate with students and utilise all modern technological advantages of digital means, which are defined by universities as requirements of digital transformation.

The digital transformation also requires the existence of a certain infrastructure to support education, training, and re-training (UNESCO, 2016; UNESCO IESALC, 2023; UNESCO IESALC et al., 2024). It is a challenge for universities to recognize and meet the requirements of these digitalised, networked and global societies. HEIs must be flexible when it comes to transferring knowledge to individuals and designing their structures and curricula in line with information technologies that are constantly opening up new standards. If international developments are not followed and predicted, all the work done so far can be undone. Without continuous monitoring, research and

rapid decision-making to ensure competitiveness, this will lead to a less competitive state.

The strategic future goal of higher education is also fundamentally linked to intercultural competence, the ability to act confidently in transnational networks and the willingness to comply with contracts, principles, and ethical standards of academic behaviour in democratically constituted societies.

This leads to various changes in the structure, organisation and programs offered by higher education institutions. Changes in curricula should move towards interdisciplinary learning that focuses not only on domain-specific knowledge but also on digital and other soft skills (Akkari, 2012; Betancourt, 2004; Candau, 2012; Zenk et al., 2024). Institutional change should focus on technology-enhanced new learning environments that result from close collaboration and interaction and the joint development of educational concepts with students and companies. Collaboration with industry is gaining importance leading to research opportunities and the implementation of innovative teaching methods that prepare students for the digital workplace with highly qualified and individualised pedagogical skills (Mahmood, 2021; Ramírez-Montoya et al., 2021; UNESCO, 2020; UNESCO IESALC et al., 2024).

Educational institutions, especially universities, are indispensable for societies and economies facing digital challenges, but are also struggling to keep pace with the ongoing processes of change. The demands that companies place on university graduates are constantly changing as the digital revolution has created a need for a highly skilled and knowledge-based workforce. The requirements for self-motivated, autonomous learning and collaboration as well as developing the ability to innovate and problem-solve in digitally networked contexts have increased exponentially (Akour & Alenezi, 2022; Giang et al., 2021; Goulart et al., 2022; Hollenstein et al., 2022; Kaputa et al., 2022; Tang et al., 2020).

Digital transformation, digitalised societies and economies enable people everywhere to use digital devices to find and share information, keep up-to-date with news and political events, while facilitating the functioning of national and state institutions and organisation of health and education services (Cetindamar Kozanoglu & Abedin, 2021, 2021; Iivari et al., 2020). In this sense, digitalised societies are characterised not only by technological change, but also by changes in all areas of the economy and society (Brunetti et al., 2020; UNESCO IESALC, 2023; UNESCO IESALC et al., 2024).

Digital Competences: Challenges For Students, Workers, Citizens, And Hei

Despite numerous recent advances, technology researchers still do not have a holistic and standardised concept of digital transformation. Moreover, business people are increasingly concerned about the social and ethical implications of widespread use and mastery of technology, rather than the impact on the planet. At the same time, the integration of all relevant aspects of technological expertise is simply unattainable for narrow efficiency and market-based models. It follows that it is the moral duty of of educators in economic policy to educate university students transversally and ensure that the entire population acquires common digital knowledge to discuss technological change.

In terms of key technologies, there is no definitive agreement about what these technologies are, but the most frequently mentioned ones include big data, analytics, blockchain, Internet of Things, (advanced) wireless technology, machine learning, artificial intelligence, cognitive computing, robotics, virtual/augmented reality, 3D printing, cloud technology, high-performance computing, fog computing, edge computing, etc. (Ashaari et al., 2021, 2021; Benitez et al., 2023; Bucea-Manea-Țoniş et al., 2021; Hersh, 2020)

Timely access to innovations of the continuously future-oriented education requires close collaboration between industry and educational institutions to equip the future workforce with new digital competencies (Goulart et al., 2022; Li, 2022; Rotatori et al., 2021). This commitment is all the more important as we live in an era of digital transformation, where other more difficult to teach skills such as collaborative problem-solving, practical creativity , originality in idea generation, time-management, leadership, negotiation skills and independence in learning are required (Akour & Alenezi, 2022; Goulart et al., 2022; Hollenstein et al., 2022; Marion & Fixson, 2021; Tangi et al., 2021). These necessary skills and competencies generally correspond to the skills of 21st-century, the "5Cs": creativity, communication, collaboration, critical thinking, and citizenship (Jessica Jane FitzPatrick, 2021). People are simultaneously drivers of the digital age that is currently taking place and are affected in all aspects of their lives by this digital transformation, which is driven by a rapidly growing amount of data, an increasing number of digital resources available, and the use of digital technologies. Citizens should therefore be able to handle data properly and manage a wealth of diverse digital resources efficiently.

For the digital age we will need versatile, lifelong digital skills and competencies that go beyond digital literacy. Future workers and entrepreneurs should master general and advanced digital skills at different levels in programming, simulation, data processing, and computational thinking as well as various application areas such as visualisation. Both the growing number of students willing to participate in new forms of digital learning and the need for more and more different digital technologies point to potential large business opportunities and define new potential areas of expertise for researchers and educators (Ovcharuk et al., 2020). Formal frameworks for fostering these multi-grade digital skills and competences are crucial not only for students at different educational levels, but also for professional, as well as for educators and future employers (Akour & Alenezi, 2022; Alenezi et al., 2023; Monteiro & Leite, 2021). These opportunities will benefit from collaboration between education and training.

One widely cited and upheld group of stakeholder demands is based on the requirements of Industry 4.0. Industry 4.0 is characterised by a dynamic, flexible network of interconnected value chains in which data-driven, digital ecosystems allow for a strong connection between product and production "turning the product into the means of production" (Benitez et al., 2023; Cañas et al., 2021; Karnik et al., 2022). This fourth industrial revolution can only be achieved by creating smart environments that carefully combine new technologies and human intelligence withinto the common good and address the challenges of demographic change. Despite their typical scepticism towards major innovations, higher education institutions and their management models must engage in a long-term transition process towards continuous updating and lifelong learning of all human capital (Dede & Richards, 2020; Morley & Jamil, 2021).

The complexity of developing digital transformation strategies in higher education institutions

stems from the broader societal changes associated with digitalisation. First of all, HEIs need to be aware that they operate in digitally advanced societies embedded in a broader societal ecosystem, and that digitalisation therefore affects a large number of their stakeholders. Stakeholders demand a wide range of new services, curricula and social activities related to institutional development and digital transformation (Benavides et al., 2020; Giang et al., 2021; Goulart et al., 2022; Kaputa et al., 2022). In the broadest sense, these services and activities are not only interconnected learning experiences that correlate with high employability and employee well-being but also overarching societal values and controls (Schettino et al., 2022).

Cultural Changes: A Way To Implement The Digital Transformation Processes In Higher Education Institutions

For the digital transformation to be successful, it must be an organisational change. For large higher education institutions, change should start small and model transformative leadership, urgency, structure and strong communication (Eddy & Kirby, 2020; Ruben & De Lisi, 2017). The top vision should not only be shared by a small group of leaders but by the entire university community. In this context, the team needs to educate the institution about what it means to live and support the vision of teaching and learning in the digital age. It must be actively supported by adequate funding to ensure that updated infrastructure, resources and instructional design support are provided for faculty and students (Eddy & Kirby, 2020; Grabill et al., 2022). There should also be increased investment in and sharing of data resources.

Faculty members are critical to the overall success of digital transformation, and infrastructural investments such as the establishment of online courses and technologically equipped classrooms are meaningless without highly skilled faculty members who are able to utilise these powerful tools to promote learning outcomes (lifelong learning in higher education (Owusu-Agyeman, 2021; Schiuma et al., 2022). This means that the curriculum must be ready for use not only in terms of teaching materials and support, but also in terms of the human resource infrastructure to support it.

Among the many interactions, some of which involve legal constraints, the most important aspect is that which links managers with researchers and lecturers. Some of the issues that have been perceived as detrimental to these relationships are the lack of informed and decisive decision-making and insufficient time for critical thinking and reflection on initiatives undertaken. The processes that need to be undertaken to address these problems lie in defining, simplifying and adapting the bureaucracy and administrative tasks to achieve greater financial efficiency and greater flexibility and availability of resources.

Due to the impact of the digital transformation on HEIs, a new style of leadership is required. Changes in organisational and management culture are required; without these, alignment between strategy, structure, and culture is not possible (Sharma & Jain, 2022). Digital transformation requires changes at a strategic level in a higher education institution, and developing a digital strategy can give institutions a competitive advantage (Brasil, 2018, 2021; UNESCO IESALC et al., 2024). In order to make and implement strategic decisions, governance mechanisms, which in the context of

the HEIs are all responsible administrative bodies, should be able to align the strategy with their goals and fulfill the expectations and needs of stakeholders (Brasil, 2018, 2021; UNESCO IESALC et al., 2024). A significant milestone is to achieve a changed and innovation-oriented culture for the higher education institution. This implies (1) the continuous formulation and implementation of innovation and science, technology, engineering and mathematics initiatives by the government; (2) administrators to become technology enablers; (3) focus on market needs and partnership creation in co-developing digital strategies; (4) human capital to be developed; and (5) robust management and governance mechanisms and competences to be promoted (Weiss et al., 2021).

Ethical Considerations In The Digital Transformation

In recent years, the discussion about digital transformation has attracted a great deal of attention. The aim of these initiatives is to open up digital opportunities to every university student. However, it is also necessary to discuss possible side effects of the initiatives in order to avoid potential risks. Ensuring the safety of the young population (in particular their enhancement to good use, their online privacy, and their critical stance as digital consumers) must remain a key focus of higher education institutions adopting digital transformation initiatives.

The digital side effects do not only concern the content of the educational process, but also the reality of people in the educational context. From this perspective, numerous studies have been conducted on the use of digital technologies in higher education institutions. As higher education institutions are increasingly interacting with digital technologies, they should be better prepared to consider data protection and ethics

Digital transformation has become an important part of the higher education sector by focusing on networked digitalisation to solve problems and create sustainable solutions (Giesenbauer & Müller-Christ, 2020; Mohamed Hashim, Tlemsani, & Matthews, 2022). On the other hand, privacy settings can also be used as a tool to control consumer behavior. In this direction, HEIs are also investing in research initiatives aimed at protecting members of society from the risks arising from the rapidly increasing use of digital-oriented tools in people's everyday lives (Jiang, 2022).

In the digital space, security and ease of use must be balanced, especially to ensure access for students from different social and economic backgrounds. However, measures to protect the transfer of knowledge that go hand in hand with initiatives to promote a balance between access and data security often make higher education institutions' initiatives more expensive and less attractive to the end user: the student.

Conclusion

The digital transformation of higher education institutions and the role of digital technology in these organisations' relationships with students, teachers and society are currently topics that demand the immediate attention of the academic and corporate research community. Evidence of this growing attention is provided by research in matters related to this topic, such as (Benavides et

al., 2020; Qureshi et al., 2021). Conceptually, digital transformation in HEIs could be understood as a continuous process of reinventing the organization that involves the dynamic adaptation of the organisation's strategy, processes, use of technology and organisational culture to meet the environmental changes and prepare it for the expected challenges so that it is able to take advantage of the opportunities of the digital age.

Information and communication technologies (ICT) enable the individualisation, customisation and lifecycle support of educational processes and their digital content. Furthermore, student acquisition, authentication, and helpdesk processes can become more efficient with improved accuracy (Waghid, 2023). ICT also enables differentiation by offering attractive pedagogical responses to individual expectations, which promotes student satisfaction and completion and moves to the level of differentiators.

Despite the considerable progress in research on digital transformation, current research cannot yet properly assess the changes in higher education institutions. Among the changes are that traditional face-to-face teaching will soon be complemented by innovative and personalised education; faculties supervising assignments together and without disciplinary overlap will be replaced by interdisciplinary research groups; that funding agencies and governments will deploy complex validation procedures that develop automated processes within educational workflows; and that isolated universities will be replaced by educational networks that offer better services based on students' individual learning characteristics (Alenezi et al., 2023; Guppy et al., 2022; Stevens et al., 2021). There is an emerging trend to replace the traditional physical, ones-way and independently organised processes with blended and networked processes that are interactive, dynamic and interconnected (Dixit & Pathak, 2023; Haleem et al., 2022).

The digital transformation is having a profound and far-reaching impact on higher education institutions. Its process is changing the institutional nature and operational models in in higher education by challenging existing management practises and scholarship. The changes associated with digital transformation in higher education institutions go beyond the creation and use of digital systems and tools: they aim at a systematic and strategic development with technological, institutional and administrative aspects that improve access and opportunities for students from different social, political and cultural backgrounds.

Higher education institutions can provide the foundation and environment to foster society-wide digital transformation by developing competences inin students and offering curricula that support learning experiences, meaningful challenges and more open discussions. In this context the article summarises seven recommendations for higher education institutions for digital transformation processes:

(1) Promote the creation the appropriate infrastructure to support digital transformation projects;
(2) Decentralise the decision-making power to enable flexibility and adaptability of higher education departments;
(3) Engage and digitalise all administrative services at every organisational level;
(4) Seek to participate in enriching environments to share information and experiences with other similar organisations;
(5) Promotion of innovative initiatives and constant re-evaluation and adaptation of ongoing

initiatives;
(6) Promotion of digital literacy and professional development of members of all higher education institutions;
(7) Promotion of intercultural and interdisciplinary competences among students.

Digital transformation has become a significant challenge for organisations of all kinds, and higher education institutions are no exception. As a global trend, digital transformation is embedded in various research disciplines all around the world.

The isolated application of digital tools cannot be considered digital transformation. Likewise, digital transformation in universities should not be viewed solely as a response to increasing national and international competition, as a survival strategy in a changing education market, or as a means of increasing academic performance, but rather as a necessary process to maintain the value of HEIs in an increasingly rapidly changing and interconnected world. While it is indeed important for higher education institutions to demonstrate that they can keep pace with and contribute to digital developments in the wider context of business and society, the question of how they can best use digitalisation to fulfill their social, cultural and educational mission should be a subject of ongoing discussion among higher education stakeholders. They should explore how both educational and societal value can be enhanced through various digital tools, digitisation strategies, innovative initiatives and the modernisation of scholarship.

In conclusion, understanding digital transformation as a natural process that higher education institutions must undergo is increasingly important for all stakeholders in the education system, including students, professors, coordinators administrative staff and the society in general.

Bibliography:

Abad-Segura, E., González-Zamar, M.-D., Infante-Moro, J. C., & Ruipérez García, G. (2020). Sustainable Management of Digital Transformation in Higher Education: Global Research Trends. *Sustainability*, *12*(5), 2107. https://doi.org/10.3390/su12052107

Akkari, A. (2012). Intercultural education in Brazil: Between conservatism and radical transformations. *UNESCO IBE*, 161–175.

Akour, M., & Alenezi, M. (2022). Higher Education Future in the Era of Digital Transformation. *Education Sciences*, *12*(11). https://doi.org/10.3390/educsci12110784

Alenezi, M., Wardat, S., & Akour, M. (2023). The Need of Integrating Digital Education in Higher Education: Challenges and Opportunities. *Sustainability*, *15*(6), 4782. https://doi.org/10.3390/su15064782

Argüelles-Cruz, A.-J., García-Peñalvo, F.-J., & Ramírez-Montoya, M.-S. (2021). Education in Latin America: Toward the Digital Transformation in Universities. In D. Burgos & J. W. Branch (Eds.), *Radical Solutions for Digital Transformation in Latin American Universities: Artificial Intelligence and Technology 4.0 in Higher Education* (pp. 93–108). Springer. https://doi.org/10.1007/978-981-16-3941-8_6

Ashaari, M. A., Singh, K. S. D., Abbasi, G. A., Amran, A., & Liebana-Cabanillas, F. J. (2021). Big data analytics capability for improved performance of higher education institutions in the Era of IR 4.0: A multi-analytical SEM & ANN perspective. *Technological Forecasting and Social Change*, *173*, 121119.

https://doi.org/10.1016/j.techfore.2021.121119

Benavides, L. M. C., Tamayo Arias, J. A., Arango Serna, M. D., Branch Bedoya, J. W., & Burgos, D. (2020). Digital Transformation in Higher Education Institutions: A Systematic Literature Review. *Sensors*, *20*(11), Article 11. https://doi.org/10.3390/s20113291

Benitez, G. B., Ghezzi, A., & Frank, A. G. (2023). When technologies become Industry 4.0 platforms: Defining the role of digital technologies through a boundary-spanning perspective. *International Journal of Production Economics*, *260*, 108858. https://doi.org/10.1016/j.ijpe.2023.108858

Betancourt, R. F. (2004). A Interculturalidade como Alternativa à Violência. *Razão e Fé*, 5–16.

Brasil. (2018). *Estratégia Brasileira para a Transformação Digital (E-Digital)*. Ministério da Ciência, Tecnologia, Inovações e Comunicações.

Brasil. (2021). *Plano de Transformação Digital do Ministério da Educação*. Ministério da Educação. https://www.gov.br/mec/pt-br/assuntos-1/transformacao-digital/arquivos/ptde-2021-2022.pdf

Brunetti, F., Matt, D. T., Bonfanti, A., De Longhi, A., Pedrini, G., & Orzes, G. (2020). Digital transformation challenges: Strategies emerging from a multi-stakeholder approach. *The TQM Journal*, *32*(4), 697–724. https://doi.org/10.1108/TQM-12-2019-0309

Bucea-Manea-Ţoniş, R., Martins, O. M. D., Bucea-Manea-Ţoniş, R., Gheorghiță, C., Kuleto, V., Ilić, M. P., & Simion, V.-E. (2021). Blockchain Technology Enhances Sustainable Higher Education. *Sustainability*, *13*(22), 12347. https://doi.org/10.3390/su132212347

Bygstad, B., Øvrelid, E., Ludvigsen, S., & Dæhlen, M. (2022). From dual digitalization to digital learning space: Exploring the digital transformation of higher education. *Computers & Education*, *182*, 104463. https://doi.org/10.1016/j.compedu.2022.104463

Cañas, H., Mula, J., Díaz-Madroñero, M., & Campuzano-Bolarín, F. (2021). Implementing Industry 4.0 principles. *Computers & Industrial Engineering*, *158*, 107379. https://doi.org/10.1016/j.cie.2021.107379

Candau, V. (2012). Diferenças Culturais, Interculturalidade E Educação Em Direitos Humanos. *Educação & Sociedade*, 235–250.

Castells, M. (2014). Globalisation and Identity. *Quaderns de La Mediterrània*, 89–98.

Cetindamar Kozanoglu, D., & Abedin, B. (2021). Understanding the role of employees in digital transformation: Conceptualization of digital literacy of employees as a multi-dimensional organizational affordance. *Journal of Enterprise Information Management*, *34*(6), 1649–1672. https://doi.org/10.1108/JEIM-01-2020-0010

Cheng, M., Adekola, O., Albia, J., & Cai, S. (2022). Employability in higher education: A review of key stakeholders' perspectives. *Higher Education Evaluation and Development*, *16*(1), 16–31. https://doi.org/10.1108/HEED-03-2021-0025

Dede, C., & Richards, J. (Eds.). (2020). *The 60-year curriculum: New models for lifelong learning in the digital economy*. Routledge, Taylor & Francis Group.

Dixit, P., & Pathak, U. (2023). Students' Learning Outcomes and Emerging Practices of Blended Learning: A Case Study. In N. J. Ahuja, A. Kumar, & A. Nayyar (Eds.), *Sustainable Blended Learning in STEM Education for Students with Additional Needs* (pp. 247–277). Springer Nature Singapore. https://doi.org/10.1007/978-981-99-3497-3_11

Eddy, P. L., & Kirby, E. (2020). *Leading for tomorrow: A primer for succeeding in higher education leadership*. Rutgers University Press.

García-Morales, V. J., Garrido-Moreno, A., & Martín-Rojas, R. (2021). The Transformation of Higher Education After the COVID Disruption: Emerging Challenges in an Online Learning Scenario. *Frontiers in Psychology*, *12*, 616059. https://doi.org/10.3389/fpsyg.2021.616059

García-Peñalvo, F. J. (2021). Avoiding the Dark Side of Digital Transformation in Teaching. An Institutional Reference Framework for eLearning in Higher Education. *Sustainability*, *13*(4), 2023. https://doi.org/10.3390/su13042023

Giang, N. T. H., Hai, P. T. T., Tu, N. T. T., & Tan, P. X. (2021). Exploring the Readiness for Digital Transformation in a Higher Education Institution towards Industrial Revolution 4.0. *International Journal of Engineering Pedagogy (iJEP)*, *11*(2), 4–24. https://doi.org/10.3991/ijep.v11i2.17515

Giesenbauer, B., & Müller-Christ, G. (2020). University 4.0: Promoting the Transformation of Higher Education Institutions toward Sustainable Development. *Sustainability*, *12*(8). https://doi.org/10.3390/su12083371

Goulart, V. G., Liboni, L. B., & Cezarino, L. O. (2022). Balancing skills in the digital transformation era: The future of jobs and the role of higher education. *Industry and Higher Education*, *36*(2), 118–127. https://doi.org/10.1177/09504222211029796

Grabill, J. T., Gretter, S., & Skogsberg, E. (2022). *Design for change in higher education*. Johns Hopkins University Press.

Guppy, N., Verpoorten, D., Boud, D., Lin, L., Tai, J., & Bartolic, S. (2022). The post-COVID-19 future of digital learning in higher education: Views from educators, students, and other professionals in six countries. *British Journal of Educational Technology*, *53*(6), 1750–1765. https://doi.org/10.1111/bjet.13212

Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*, *3*, 275–285. https://doi.org/10.1016/j.susoc.2022.05.004

Haque, S., Haque, M. A., Kumar, D., Mishra, K., Islam, F., Ahmad, S., Kumar, K., & Mishra, B. K. (2023). Assessing the Impact of IoT Enabled E-Learning System for Higher Education. *SN Computer Science*, *4*(5), 459. https://doi.org/10.1007/s42979-023-01860-8

Hersh, M. (2020). *Technology for inclusion: Background paper prepared for the 2020 Global Education Monitoring Report Inclusion and education*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000373655

Hollenstein, L., Thurnheer, S., & Vogt, F. (2022). Problem Solving and Digital Transformation: Acquiring Skills through Pretend Play in Kindergarten. *Education Sciences*, *12*(2), 92. https://doi.org/10.3390/educsci12020092

Iivari, N., Sharma, S., & Ventä-Olkkonen, L. (2020). Digital transformation of everyday life – How COVID-19 pandemic transformed the basic education of the young generation and why information management research should care? *Impact of COVID-19 Pandemic on Information Management Research and Practice: Editorial Perspectives*, *55*, 102183. https://doi.org/10.1016/j.ijinfomgt.2020.102183

Jessica Jane FitzPatrick. (2021). *Learning about 21st Century skills and progressive education through practitioner research* [PhD Thesis (Education), University of Canterbury]. https://ir.canterbury.ac.nz/server/api/core/bitstreams/e2677bff-9db4-425b-970a-4f81f3f26ff8/content

Jiang, X. (2022). How to lead a successful university transformation: The case of École Polytechnique Fédérale de Lausanne (EPFL). *Educational Management Administration & Leadership*, *50*(5), 792–811. https://doi.org/10.1177/1741143220953600

Kannadhasan, S., Shanmuganantham, M., Nagarajan, Dr. R., & Deepa, S. (2020). The Role of Future E-Learning System and Higher Education. *International Journal of Advanced Research in Science, Communication and Technology*, 261–266. https://doi.org/10.48175/IJARSCT-673

Kaputa, V., Loučanová, E., & Tejerina-Gaite, F. A. (2022). Digital Transformation in Higher Education Institutions as a Driver of Social Oriented Innovations. In C. Păunescu, K.-L. Lepik, & N. Spencer (Eds.), *Social Innovation in Higher Education* (pp. 61–85). Springer International Publishing. https://doi.org/10.1007/978-3-030-84044-0_4

Karnik, N., Bora, U., Bhadri, K., Kadambi, P., & Dhatrak, P. (2022). A comprehensive study on current and future trends towards the characteristics and enablers of industry 4.0. *Journal of Industrial Information Integration*, *27*, 100294. https://doi.org/10.1016/j.jii.2021.100294

Kraus, S., Jones, P., Kailer, N., Weinmann, A., Chaparro-Banegas, N., & Roig-Tierno, N. (2021). Digital Transformation: An Overview of the Current State of the Art of Research. *SAGE Open*, *11*(3), 215824402110475. https://doi.org/10.1177/21582440211047576

Langrafe, T. D. F., Barakat, S. R., Stocker, F., & Boaventura, J. M. G. (2020). A stakeholder theory approach to creating value in higher education institutions. *The Bottom Line*, *33*(4), 297–313. https://doi.org/10.1108/BL-03-2020-0021

Li, L. (2022). Reskilling and Upskilling the Future-ready Workforce for Industry 4.0 and Beyond. *Information Systems Frontiers*. https://doi.org/10.1007/s10796-022-10308-y

Mahmood, S. (2021). Instructional Strategies for Online Teaching in COVID -19 Pandemic. *Human Behavior and Emerging Technologies*, *3*(1), 199–203. https://doi.org/10.1002/hbe2.218

Marion, T. J., & Fixson, S. K. (2021). The Transformation of the Innovation Process: How Digital Tools are Changing Work, Collaboration, and Organizations in New Product Development*. *Journal of Product Innovation Management*, *38*(1), 192–215. https://doi.org/10.1111/jpim.12547

Miceli, A., Hagen, B., Riccardi, M. P., Sotti, F., & Settembre-Blundo, D. (2021). Thriving, Not Just Surviving in Changing Times: How Sustainability, Agility and Digitalization Intertwine with Organizational Resilience. *Sustainability*, *13*(4). https://doi.org/10.3390/su13042052

Mohamed Hashim, M. A., Tlemsani, I., & Duncan Matthews, R. (2022). A sustainable University: Digital Transformation and Beyond. *Education and Information Technologies*, *27*(7), 8961–8996. https://doi.org/10.1007/s10639-022-10968-y

Mohamed Hashim, M. A., Tlemsani, I., & Matthews, R. (2022). Higher education strategy in digital transformation. *Education and Information Technologies*, *27*(3), 3171–3195. https://doi.org/10.1007/s10639-021-10739-1

Molenda, M. H. (2022). History and Development of Instructional Design and Technology. In *Handbook of Open, Distance and Digital Education* (pp. 1–18). Springer Singapore. https://doi.org/10.1007/978-981-19-0351-9_4-1

Monteiro, A., & Leite, C. (2021). Digital literacies in higher education: Skills, uses, opportunities and obstacles to digital transformation. *Revista de Educación a Distancia (RED)*, *21*(65). https://doi.org/10.6018/red.438721

Morley, D. A., & Jamil, M. G. (2021). Introduction: Real World Learning—Recalibrating the Higher Education Response Towards Application to Lifelong Learning and Diverse Career Paths. In D. A. Morley & M. G. Jamil (Eds.), *Applied Pedagogies for Higher Education* (pp. 1–17). Springer International Publishing. https://doi.org/10.1007/978-3-030-46951-1_1

Ovcharuk, O., Ivaniuk, I., Soroko, N., Gritsenchuk, O., & Kravchyna, O. (2020). The use of digital learning tools in the teachers' professional activities to ensure sustainable development and democratization of education in European countries. *E3S Web of Conferences*, *166*, 10019. https://doi.org/10.1051/e3sconf/202016610019

Owusu-Agyeman, Y. (2021). Transformational leadership and innovation in higher education: A participative process approach. *International Journal of Leadership in Education*, *24*(5), 694–716. https://doi.org/10.1080/13603124.2019.1623919

Panthalookaran, V. (2022). Education in a VUCA-driven World: Salient Features of an Entrepreneurial Pedagogy. *Higher Education for the Future*, *9*(2), 234–249. https://doi.org/10.1177/23476311221108808

Peng, Y., & Tao, C. (2022). Can digital transformation promote enterprise performance? —From the perspective of public policy and innovation. *Journal of Innovation & Knowledge*, *7*(3), 100198. https://doi.org/10.1016/j.jik.2022.100198

Phelps, C. E. (2007). *Globalization of Higher Education* (pp. 1–15). TIAA. https://www.tiaa.org/content/dam/tiaa/institute/pdf/full-report/2017-02/inst-advancing-higher-ed-phelps-112707.pdf

Qureshi, M. I., Khan, N., Raza, H., Imran, A., & Ismail, F. (2021). Digital Technologies in Education 4.0. Does it Enhance the Effectiveness of Learning? A Systematic Literature Review. *International Journal of Interactive Mobile Technologies (iJIM)*, *15*(04), 31. https://doi.org/10.3991/ijim.v15i04.20291

Ramírez-Montoya, M. S., Andrade-Vargas, L., Rivera-Rogel, D., & Portuguez-Castro, M. (2021). Trends for the Future of Education Programs for Professional Development. *Sustainability*, *13*(13). https://doi.org/10.3390/su13137244

Ramose, M. B. (2009). Globalização E Ubuntu. In B. de S. Santos & M. P. Meneses (Eds.), *Epistemologias do Sul* (pp. 135–176). Almedina.

Rapp, A. C., & Corral-Granados, A. (2024). Understanding inclusive education – a theoretical contribution from system theory and the constructionist perspective. *International Journal of Inclusive Education*, *28*(4), 423–439. https://doi.org/10.1080/13603116.2021.1946725

Rotatori, D., Lee, E. J., & Sleeva, S. (2021). The evolution of the workforce during the fourth industrial revolution. *Human Resource Development International*, *24*(1), 92–103. https://doi.org/10.1080/13678868.2020.1767453

Ruben, B. D., & De Lisi, R. (2017). *A guide for leaders in higher education: Core concepts, competencies, and tools* (First edition). Stylus Publishing.

Sá, M. J., & Serpa, S. (2020). The COVID-19 Pandemic as an Opportunity to Foster the Sustainable Development of Teaching in Higher Education. *Sustainability*, *12*(20), 8525. https://doi.org/10.3390/su12208525

Schettino, G., Marino, L., & Capone, V. (2022). The Impact of University-Related Variables on Students' Perceived Employability and Mental Well-Being: An Italian Longitudinal Study. *Sustainability*, *14*(5), 2671. https://doi.org/10.3390/su14052671

Schiuma, G., Schettini, E., Santarsiero, F., & Carlucci, D. (2022). The transformative leadership compass: Six competencies for digital transformation entrepreneurship. *International Journal of Entrepreneurial Behavior & Research*, *28*(5), 1273–1291. https://doi.org/10.1108/IJEBR-01-2021-0087

Sharma, P., & Jain, V. (2022). Role of Culture in Developing Transformative Leadership for Higher Education in Emerging Economies. In E. Mogaji, V. Jain, F. Maringe, & R. E. Hinson (Eds.), *Re-imagining Educational Futures in Developing Countries* (pp. 243–259). Springer International Publishing. https://doi.org/10.1007/978-3-030-88234-1_13

Stevens, G. J., Bienz, T., Wali, N., Condie, J., & Schismenos, S. (2021). Online university education is the new normal: But is face-to-face better? *Interactive Technology and Smart Education*, *18*(3), 278–297. https://doi.org/10.1108/ITSE-08-2020-0181

Tang, T., Vezzani, V., & Eriksson, V. (2020). Developing critical thinking, collective creativity skills and problem solving through playful design jams. *Thinking Skills and Creativity*, *37*, 100696. https://doi.org/10.1016/j.tsc.2020.100696

Tangi, L., Janssen, M., Benedetti, M., & Noci, G. (2021). Digital government transformation: A structural equation modelling analysis of driving and impeding factors. *International Journal of Information Management*, *60*, 102356. https://doi.org/10.1016/j.ijinfomgt.2021.102356

UNESCO. (2016). *Education 2030: Incheon Declaration and Framework for Action for the implementation of Sustainable Development Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*.

UNESCO. (2020). *Global Education Monitoring Report 2020: Inclusion and education: All means all*. UNESCO. https://doi.org/10.54676/JJNK6989

UNESCO IESALC. (2022). *The right to higher education a social justice perspective*. UNESCO.

UNESCO IESALC. (2023). *Harnessing the era of artificial intelligence in higher education: A primer for higher education stakeholders*. https://unesdoc.unesco.org/ark:/48223/pf0000386670

UNESCO IESALC, Sabzalieva, E., Chacón, E., Pereira, A. E., Valentini, A., Caballero, L. G., & Abdrasheva,

D. (2024). *Transforming the digital landscape of higher education in Latin America and the Caribbean*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000388361

Waghid, F. (2023). Crises, changed leadership, change management and educational technology. *South African Journal of Higher Education*, *37*(4). https://doi.org/10.20853/37-4-6011

Weiss, M., Barth, M., & Von Wehrden, H. (2021). The patterns of curriculum change processes that embed sustainability in higher education institutions. *Sustainability Science*, *16*(5), 1579–1593. https://doi.org/10.1007/s11625-021-00984-1

Zenk, L., Pausits, A., Brenner, B., Campbell, D. F. J., Behrens, D. A., Stöckler, E. M., Oppl, S., & Steiner, G. (2024). Meta-competences in complex environments: An interdisciplinary perspective. *Thinking Skills and Creativity*, 101515. https://doi.org/10.1016/j.tsc.2024.101515